# 6. Algebraic Expressions and Identities

## Exercise 6.1

**1. Question**

Indetify the terms, their coeffcients for each of the following expressions.

(i) $7x^2yz - 5xy$

(ii) $x^2 + x + 1$

(iii) $3x^2y^2 - 5x^2y^2z^2 + z^2$

(iv) $9 - ab + bc - ca$

(v) $\dfrac{a}{2} + \dfrac{b}{2} - ab$

(vi) $0.2x - 0.3xy + 0.5y$

**Answer**

(i) $7x^2yz - 5xy$

This equation consists of two terms that are:

$7x^2yz$ and $-5xy$

The coefficient of $7x^2yz$ is 7

The coefficient of $-5xy$ is $-5$

(ii) $x^2 + x + 1$

This equation consists of three terms that are:

$x^2$, x, 1

The coefficient of $x^2$ is 1

The coefficient of x is 1

The coefficient of 1 is 1

(iii) $3x^2y^2 - 5x^2y^2z^2 + z^2$

This equation consists of three terms that are:

$3x^2y$, $-5x^2y^2z^2$ and $z^2$

The coefficient of $3x^2y$ is 3

The coefficient of $-5x^2y^2z^2$ is $-5$

The coefficient of $z^2$ is 1

(iv) $9 - ab + bc - ca$

| The term | Coefficient |
| --- | --- |
| 9 | 9 |
| -ab | -1 |
| bc | 1 |
| ca | -1 |

(v) $\dfrac{a}{2} + \dfrac{b}{2} - ab$

| The term | Coefficient |
| --- | --- |
| $\frac{a}{2}$ | 1 |
| $\frac{b}{2}$ | 1 |
| -ab | 1 |

(vi) $0.2x - 0.3xy + 0.5y$

| The term | Coefficient |
| --- | --- |
| 0.2x | 0.2 |
| -0.3xy | -0.3 |
| 0.5y | 0.5 |

## 2. Question

Classify the following polynomials as monomials, binomials, trinomials. Which polynomials do not fit in any category?

(i) x+y

(ii) 1000

(iii) $x+x^2+x^3+x^4$

(iv)7+a+5b

(v) $2b-3b^2$

(vi) $2y-3y^2+4y^3$

(vii) 5x-4y+3x

(viii) $4a-15a^2$

(ix) xy+yz+zt+tx

(x) pqr

(xi) $p^2q+pq^2$

(xii) 2p+2q

**Answer**

(i) x+y

This expression contains two terms x and y

So, it is called 'Binomial'

(ii) 1000

It contains one term 1000

So, it is called monomial

(iii) $x+x^2+x^3+x^4$

It contains four terms

So, it is not a monomial, binomial and trinomial

(iv)7+a+5b

It contains three terms

So, it is called trinomial

(v) $2b - 3b^2$

It contains two terms

So, it is called binomial

(vi) $2y - 3y^2 + 4y^3$

It contains three terms

So, it is called trinomial

(vii) $5x - 4y + 3x$

$8x - 4y$

It contains two terms

So, it is called binomial

(viii) $4a - 15a^2$

It contains two terms

So, it is called binomial

(ix) $xy + yz + zt + tx$

It contains four terms

So, it is not a monomial, binomial and trinomial

(x) $pqr$

It contains one term

So, it is called monomial

(xi) $p^2q + pq^2$

It contains two terms

So, it is called binomial

(xii) $2p + 2q$

It contains two terms

So, it is called monomial

## Exercise 6.2

### 1. Question

Add the following algebraic expressions:

(i) $3a^2b, -4a^2b, 9a^2b$

(ii) $\frac{2}{3}a, \frac{3}{5}a, -\frac{6}{5}a$

(iii) $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5xy^2$

(iv) $\frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c, \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c, \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$

(v) $\frac{11}{2}xy + \frac{12}{5}y + \frac{13}{7}x, -\frac{11}{2}y - \frac{12}{5}x - \frac{13}{7}xy$

(vi) $\frac{7}{2}x^3 - \frac{1}{2}x^2 + \frac{5}{3}, \frac{3}{2}x^3 + \frac{7}{4}x^2 - x + \frac{1}{3}, \frac{3}{2}x^2 - \frac{5}{2}x - 2$

**Answer**

(i) $3a^2b$, $-4a^2b$, $9a^2b$

$= 3a^2b + (-4a^2b) + 9a^2b$

$= 3a^2b - 4a^2b + 9a^2b$

$= 3a^2b$

(ii) $\frac{2}{3}a, \frac{3}{5}a, -\frac{6}{5}a$

$= \frac{2}{3}a + \frac{3}{5}a - \frac{6}{5}a$

Taking L.C.M 3, 5 , 5 is 15

$= 11\frac{10a+9a-18a}{15}$

$= \frac{19a-18a}{15}$

$= \frac{a}{15}$

(iii) $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5xy^2$

$= 4xy^2 - 7x^2y + 12x^2y - 6xy^2 - 3x^2y + 5xy^2$

$= 4x^2 + 12x^2y - 3x^2y - 7x^2y - 6xy^2 + 5xy^2$

$= 3xy^2 + 2x^2y$

(iv) $\frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c, \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c, \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$

Adding all, we get

$= \frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c + \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c + \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$

$= \frac{9a+4a+10a}{6} + \frac{-5b-14b+10b}{4} + \frac{8c+70c-25c}{20}$

$= \frac{23a}{6} - \frac{9b}{4} + \frac{53c}{20}$

(v) $\frac{11}{2}xy + \frac{12}{5}y + \frac{13}{7}x, -\frac{11}{2}y - \frac{12}{5}x - \frac{13}{7}xy$

Adding all, we get

$= \frac{11}{2}xy + \frac{11}{5}y + \frac{13}{7}x + \frac{-11}{2}y - \frac{12}{5}x - \frac{13}{7}xy$

$= \frac{11xy-12xy}{14} + \frac{24y-55y}{10} + \frac{65x-84x}{35}$

$= \frac{51xy}{14} - \frac{19x}{35} - \frac{31y}{10}$

(vi) $\frac{7}{2}x^3 - \frac{1}{2}x^2 + \frac{5}{3}, \frac{3}{2}x^3 + \frac{7}{4}x^2 - x + \frac{1}{3}, \frac{3}{2}x^2 - \frac{5}{2}x - 2$

Adding all, we get

$= \frac{7}{2}x^3 - \frac{1}{2}x^2 + \frac{5}{3} + \frac{3}{2}x^3 + \frac{7}{4}x^2 - x + \frac{1}{3} + \frac{3}{2}x^2 - \frac{5}{2}x - 2$

$= \frac{10}{2}x^3 + \frac{11}{4}x^2 - \frac{7x}{2} + \frac{0}{6}$

$= 5x^3 + \frac{11}{4}x^2 - \frac{7x}{2}$

**2. Question**

Subtract:

(i) -5xy from 12xy

(ii) $2a^2$ from $-7a^2$

(iii) 2a-b from 3a-5b

(iv) $2x^3 - 4x^2 + 3x + 5$ from $4x^3 + x^2 + x + 6$

(v) $\frac{3}{2}y^3 - \frac{2}{7}y^2 - 5$ from $\frac{1}{3}y^3 + \frac{5}{7}y^2 + y - 2$

(vi) $\frac{3}{2}x - \frac{5}{4}y - \frac{7}{2}z$ from $\frac{2}{3}x + \frac{3}{2}y - \frac{4}{3}z$

(vii) $x^2 - \frac{4}{5}xy^2 + \frac{4}{3}xy$ from $\frac{2}{3}x^2y + \frac{3}{2}xy^2 - \frac{1}{3}xy$

(viii) $\frac{ab}{7} - \frac{35}{3}bc + \frac{6}{5}ac$ from $\frac{3}{5}bc - \frac{4}{5}ac$

**Answer**

(i) -5xy from 12xy

After subtracting,we get

= 12xy - (- 5xy)

= 5xy + 12xy

= 17xy

(ii) $2a^2$ from $-7a^2$

After subtracting, we get

= $2a^2$ + $(-7a^2)$

= $-2a^2$ + $7a^2$

= $-9a^2$

(iii) 2a-b from 3a-5b

After subtracting, we get

= -(2a – b)+ (3a – 5b)

= -2a + b+ 3a – 5b

= a – 4b

(iv) $2x^3 - 4x^2 + 3x + 5$ from $4x^3 + x^2 + x + 6$

After subtracting, we get

= - ($2x^3$ – $4x^2$ + 3x + 5) + ($4x^3$ + $x^2$ + x + 6)

= - $2x^3$ + $4x^2$ – 3x – 5 + $4x^3$ + $x^2$ + x + 6

= $2x^3$ + $5x^2$ – 2x + 1

(v) $\frac{3}{2}y^3 - \frac{2}{7}y^2 - 5$ from $\frac{1}{3}y^3 + \frac{5}{7}y^2 + y - 2$

After subtracting, we get

= $\frac{1}{3}y^2$ + $\frac{5}{7}y^2$ + y – 2 - $\frac{2}{3}y^3$ + $\frac{2}{7}y^2$ + 5

$= \frac{-1}{3}y^3 + \frac{7}{7}y^2 + y + 3$

$= \frac{-1}{3}y^3 + y^2 + y + 3$

(vi) $\frac{3}{2}x - \frac{5}{4}y - \frac{7}{2}z$ from $\frac{2}{3}x + \frac{3}{2}y - \frac{4}{3}z$

After subtracting, we get

$= \frac{2}{3}x + \frac{3}{2}y - \frac{4}{3}z - (\frac{3}{2}x - \frac{5}{4}y - \frac{7}{2}z)$

$= \frac{2}{3}x - \frac{3}{2}x + \frac{3}{2}y + \frac{5}{4}y - \frac{4}{3}z + \frac{7}{2}z$

$= \frac{4x-9x}{6} + \frac{6y+5y}{4} + \frac{-8z+21z}{6}$

$= \frac{-5x}{6} + \frac{11y}{4} + \frac{13z}{6}$

(vii) $x^2 - \frac{4}{5}xy^2 + \frac{4}{3}xy$ from $\frac{2}{3}x^2y + \frac{3}{2}xy^2 - \frac{1}{3}xy$

$= \frac{2}{3}x^2y + \frac{3}{2}xy^2 - \frac{1}{3}xy - (x^2 - \frac{4}{5}xy^2 + \frac{4}{3}xy)$

$= \frac{2}{3}x^2y - x^2y + \frac{3}{2}xy^2 + \frac{4}{5}xy^2 - \frac{1}{3}xy - \frac{4}{3}xy$

$= \frac{-1}{3}x^2y + \frac{25}{10}xy^2 - \frac{5}{3}xy$

(viii) $\frac{ab}{7} - \frac{35}{3}bc + \frac{6}{5}ac$ from $\frac{3}{5}bc - \frac{4}{5}ac$

After subtracting, we get

$= \frac{3}{5}bc - \frac{4}{5}ac - (\frac{ab}{7} - \frac{35}{3}bc + \frac{6}{5}ac)$

$= \frac{3}{5}bc + \frac{35}{3}bc - \frac{4}{5}ac - \frac{6}{5}ac - \frac{ab}{7}$

$= \frac{9bc+175bc}{15} + \frac{-4ac-6ac}{5} - \frac{ab}{7}$

$= \frac{184bc}{15} + \frac{-10ac}{5} - \frac{ab}{7}$

$= \frac{184bc}{15} - \frac{10ac}{5} - \frac{ab}{7}$

$= \frac{184bc}{15} - 2ac - \frac{ab}{7}$

## 3. Question

Take away:

(i) $\frac{6}{5}x^2 - \frac{4}{5}x^3 + \frac{5}{6} + \frac{3}{2}x$ from $\frac{x^3}{3} - \frac{5}{2}x^2 + \frac{3}{5}x + \frac{1}{4}$

(ii) $\frac{5a^2}{2} + \frac{3a^3}{2} + \frac{a}{3} - \frac{6}{5}$ from $\frac{1}{3}a^3 - \frac{3}{4}a^2 - \frac{5}{2}$

(iii) $\frac{7}{4}x^3 + \frac{3}{5}x^2 + \frac{1}{2}x + \frac{9}{2}$ from $\frac{7}{2} - \frac{x}{3} - \frac{x^2}{5}$

(iv) $\frac{y^3}{3} + \frac{7}{3}y^2 + \frac{1}{2}y + \frac{1}{2}$ from $\frac{1}{3} - \frac{5}{3}y^2$

(v) $\frac{2}{3}ac - \frac{5}{7}ab + \frac{2}{3}bc$ from $\frac{3}{2}ab - \frac{7}{4}ac - \frac{5}{6}bc$

**Answer**

(i) $\frac{6}{5}x^2 - \frac{4}{5}x^3 + \frac{5}{6} + \frac{3}{2}x$ from $\frac{x^3}{3} - \frac{5}{2}x^2 + \frac{3}{5}x + \frac{1}{4}$

$= \frac{1}{3}x^3 - \frac{5}{2}x^2 + \frac{3}{5}x + \frac{1}{4} - (\frac{6}{5}x^2 - \frac{4}{5}x^3 + \frac{5}{6} + \frac{3}{2}x)$

$= \frac{1}{3}x^3 + \frac{4}{5}x^3 - \frac{5}{2}x^2 - \frac{6}{5}x^2 + \frac{3}{5}x - \frac{3}{2}x + \frac{1}{4} - \frac{5}{6}$

$= \frac{17}{15}x^3 - \frac{37}{10}x^2 - \frac{9x}{10} - \frac{14}{24}$

$= \frac{17}{15}x^3 - \frac{37}{10}x^2 - \frac{9}{10}x - \frac{7}{12}$

(ii) $\frac{5a^2}{2} + \frac{3a^3}{2} + \frac{a}{3} - \frac{6}{5}$ from $\frac{1}{3}a^3 - \frac{3}{4}a^2 - \frac{5}{2}$

$= \frac{1}{3}a^3 - \frac{3}{4}a^2 - \frac{5}{2} - (\frac{5}{2}a^2 + \frac{3}{2}a^2 + \frac{a}{3} - \frac{6}{5})$

$= \frac{1}{3}a^5 - \frac{3}{2}a^3 - \frac{3}{4}a^2 - \frac{5}{2}a^2 - \frac{a}{3} - \frac{5}{2} + \frac{6}{5}$

$= \frac{1}{6}(2a^3 - 9a^3) - \frac{1}{4}(3a^2 - 10a^2) - \frac{a}{3} + \frac{-25+12}{10}$

$= \frac{-7}{6}a^3 - \frac{13}{4}a^2 - \frac{a}{3} - \frac{13}{10}$

(iii) $\frac{7}{4}x^3 + \frac{3}{5}x^2 + \frac{1}{2}x + \frac{9}{2}$ from $\frac{7}{2} - \frac{x}{3} - \frac{x^2}{5}$

$= \frac{7}{2} - \frac{x}{3} - \frac{1}{5}x^2 - (\frac{7}{4}x^3 + \frac{3}{5}x^2 + \frac{1}{2}x + \frac{9}{2})$

$= \frac{-7}{4}x^3 - \frac{1}{5}x^2 - \frac{3}{5}x^2 - \frac{x}{3} - \frac{1}{2}x + \frac{7}{2} - \frac{9}{2}$

$= \frac{-7}{4}x^3 - \frac{4}{5}x^2 - \frac{2x-3x}{6} + \frac{7-9}{2}$

$= \frac{-7}{4}x^3 - \frac{4}{5}x^2 - \frac{5x}{6} - 1$

(iv) $\frac{y^3}{3} + \frac{7}{3}y^2 + \frac{1}{2}y + \frac{1}{2}$ from $\frac{1}{3} - \frac{5}{3}y^2$

$= \frac{1}{3} - \frac{5}{3}y^2 - (\frac{1}{3}y^3 + \frac{7}{3}y^2 + \frac{1}{2}y + \frac{1}{2})$

$= \frac{-1}{3}y^3 - \frac{5}{3}y^2 - \frac{7}{3}y^2 - \frac{1}{2}y + \frac{1}{3} - \frac{1}{2}$

$= \frac{-1}{3}y^3 + \frac{1}{3}(-5y^2 - 7y^2) - \frac{1}{2}y + \frac{2-3}{2}$

$= \frac{-1}{3}y^3 - \frac{12}{3}y^2 - \frac{1}{2}y - \frac{1}{2}$

(v) $\frac{2}{3}ac - \frac{5}{7}ab + \frac{2}{3}bc$ from $\frac{3}{2}ab - \frac{7}{4}ac - \frac{5}{6}bc$

$= \frac{3}{2}ab - \frac{7}{4}ac - \frac{5}{6}bc - (\frac{2}{3}ac - \frac{5}{7}ab + \frac{2}{3}bc)$

$= \frac{3}{2}ab - \frac{5}{7}ab - \frac{7}{4}ac - \frac{2}{3}ac - \frac{5}{6}bc - \frac{2}{3}bc$

$= \frac{21ab-10ab}{14} - \frac{21ac-8ac}{12} - \frac{5bc-4bc}{b}$

$= \frac{11}{14}ab - \frac{29}{12}ac - \frac{3}{2}bc$

**4. Question**

Subtract 3x-4y-7z from the sum of x-3y+2z and -4x+9y-11z.

**Answer**

The sum of x – 3y + 2z and -4x + 9y – 11z is calculated as below:

$= (x – 3y + 2z) + (-4x + 9y – 11z)$

$= x – 4x – 3y + 9y + 2z – 11z$

$= -3x + 6y -9z$

Now, The expression 3x- 4y -7z has to be subtracted from the resultant expression i.e. -3x + 6y -9z

$= (-3x + 6y -9z) – (3x – 4y – 7z)$

$= -3x – 3x + 6y + 4y – 9z + 7z$

$= -6x + 10y – 2z$


**5. Question**

Subtract the sum of $3l-4m-7n^2$ and $2l+3m-4n^2$ from the sum of $9l+2m-3n^2$ and $-3l+m+4n^2$.........

**Answer**

Subtract the sum of $3l-4m-7n^2$ and $2l+3m-4n^2$ from the sum of $9l+2m-3n^2$ and $-3l+m+4n^2$.........

Sum of $9l + 2m – 3n^2$ and $-3l + n + 4n^2$

$= 9l + 2m – 3n^2 + (-3l + m + 4n^2)$

$= 9l – 3l + 2m + m – 3n^2 + 4n^2$

$= 6l + 3m + n^2$ (i)

Sum of $3l – 4m – 7n^2$ and $2l + 5m – 4n^2$

$= 3l – 4m – 7n^2 + 2l + 5m – 4n^2$

$= 5l – m – 11n^2$ (ii)

Subtract (i) and (ii), we get

$= 6l + 3m + n^2 – (5l – m – 11n^2)$

$= 6l – 5l + 3m + m + n^2 + 12n^2$

$= l + 4m + 13n^2$

**6. Question**

Subtract the sum of $2x-x^2+5$ and $-4x-3+7x^2$ from 5.

**Answer**

As given in the question, the Sum of $2x – x^2 + 5$ and $-4x – 3 + 7x^2$ is given as:

$= 2x – x^2 + 5 – 4x – 3 + 7x^2$

$= 2x – 4x – x^2 + 7x^2 + 5 – 3$

$= -2x + 6x^2 + 2$ (i)

Now subtracting equation (i) from 5 we get,

Subtracting (ii) from (i), we get

$= 5 - (-2x + 6x^2 + 2)$

$= 5 + 2x - 6x^2 - 2$

$= 3 + 2x - 6x^2$

Therefore, the resultant expression is $3 + 2x - 6x^2$

## 7. Question

Simplify each of the following:

(i) $x^2 - 3x + 5 - \frac{1}{2}(3x^2 - 5x + 7))$

(ii) $\left[5 - 3x + 2y - (2x - y)\right] - (3x - 7y + 9)$

(iii) $\frac{11}{2}x^2y - \frac{9}{4}xy^2 + \frac{1}{4}xy - \frac{1}{14}y^2x + \frac{1}{15}yx^2 + \frac{1}{2}xy$

(iv) $\left(\frac{1}{3}y^2 - \frac{4}{7}y + 11\right) - \left(\frac{1}{7}y - 3 + 2y^2\right) - \left(\frac{2}{7}y - \frac{2}{3}y^2 + 2\right)$

(v) $-\frac{1}{2}a^2b^2c + \frac{1}{3}ab^2c - \frac{1}{4}abc^2 - \frac{1}{5}cb^2a^2 + \frac{1}{6}cb^2a - \frac{1}{7}c^2ab + \frac{1}{8}ca^2b.$

## Answer

(i) $x^2 - 3x + 5 - \frac{1}{2}(3x^2 - 5x + 7))$

$= x^2 - \frac{1}{2}3x^2 - 3x + \frac{1}{2}5x + 5 - \frac{1}{2}7$

$= \frac{1}{2}(2x^2 - 3x^2) - \frac{1}{2}(6x + 5x) + \frac{10-7}{2}$

$= \frac{-1}{2}x^2 - \frac{x}{2} + \frac{3}{2}$

$= \frac{-1}{2}x^2 - \frac{1}{2}x + \frac{3}{2}$

(ii) $\left[5 - 3x + 2y - (2x - y)\right] - (3x - 7y + 9)$

$= 5 - 3x + 2y - 2x + y - 3x + 7y - 9$

$= -8x + 10y - 4$

(iii) $\frac{11}{2}x^2y - \frac{9}{4}xy^2 + \frac{1}{4}xy - \frac{1}{14}y^2x + \frac{1}{15}yx^2 + \frac{1}{2}xy$

$= \frac{11}{2}x^2y + \frac{1}{15}x^2y - \frac{9}{4}xy^2 - \frac{1}{14}xy^2 + \frac{1}{4}xy + \frac{1}{2}xy$

$= \frac{1}{30}(165x^2y + 2x^2y) + \frac{1}{56}(-126xy^2 - 4xy^2) + \frac{xy+2xy}{4}$

$= \frac{167}{30}x^2y - \frac{130}{56}xy^2 + \frac{3}{4}xy$

$= \frac{167}{30}x^2y - \frac{65}{28}xy^2 + \frac{3}{4}xy$

(iv) $\left(\frac{1}{3}y^2 - \frac{4}{7}y + 11\right) - \left(\frac{1}{7}y - 3 + 2y^2\right) - \left(\frac{2}{7}y - \frac{2}{3}y^2 + 2\right)$

$= \frac{1}{3}y^2 - 2y^2 - \frac{2}{3}y^2 - \frac{4}{7}y - \frac{1}{7}y - \frac{2}{7}y + 11 + 3 - 2$

$= \frac{1}{3}(y^2 - 6y^2 + 2y^2) - \frac{1}{7}(4y - y - 2y) + 14 - 2$

$= \frac{-3}{3}y^2 - \frac{7}{7}y + 12$

$= -y^2 - y + 12$

(v) $-\frac{1}{2}a^2b^2c + \frac{1}{3}ab^2c - \frac{1}{4}abc^2 - \frac{1}{5}cb^2a^2 + \frac{1}{6}cb^2a - \frac{1}{7}c^2ab + \frac{1}{8}ca^2b.$

$= \frac{-1}{2}a^2b^2c - \frac{1}{5}a^2b^2c + \frac{1}{3}ab^2c + \frac{1}{6}ab^2c - \frac{1}{4}abc^2 - \frac{1}{7}abc^2 + \frac{1}{8}a^2bc$

$= \frac{-7}{10}a^2b^2c + \frac{1}{2}ab^2c - \frac{11}{28}abc^2 + \frac{1}{8}a^2bc$

**Exercise 6.3**

**1. Question**

Find each of the following products:

$5x^2 \times 4x^3$

**Answer**

$5 \times x \times x \times x \times 4 \times x \times x \times x \times x$

$= 5 \times 4 \times x^5$

$= 20 \times x^5$

$= 20x^5$

**2. Question**

Find each of the following products:

$-3a^2 \times 4b^4$

**Answer**

$- 3 \times 4 - a^2 \times b^2$

$= -12 \times a^2 \times b^2$

$= -12a^2b^2$

**3. Question**

Find each of the following products:

$(-5xy) \times (-3x^2yz)$

**Answer**

$(-5) \times (-5) \times x \times x \times x^2 \times y \times y \times z$

$= 15 \times x^3 \times y^2 \times z$

$= 15x^3y^2z$

**4. Question**

Find each of the following products:

$\frac{1}{2}xy \times \frac{2}{3}x^2yz^2$

**Answer**

$\frac{1}{2} \times \frac{2}{3} \times x \times x \times x^2 \times y \times y \times z^2$

$= \frac{1}{3} \times x^3 \times y^2 \times z^2$

$= \frac{1}{3}x^3y^2z^2$

## 5. Question

Find each of the following products:

$\left(-\frac{7}{5}xy^2z\right) \times \left(\frac{13}{3}x^2yz^2\right)$

**Answer**

$\frac{-7}{5} \times \frac{13}{3} \times x \times x \times x^2 \times y^2 \times y \times z \times z^2$

$= \frac{-91}{15} \times x^3 \times y^3 \times z^3$

$= \frac{-91}{15}x^3y^3z^3$

## 6. Question

Find each of the following products:

$\left(\frac{-24}{25}x^3z\right) \times \left(-\frac{15}{16}xz^2y\right)$

**Answer**

$\frac{-24}{25} \times \frac{-15}{16} \times x^3 \times x \times z \times z^2 \times y$

$= \frac{18}{20} \times x^4 \times z^3 \times y$

$= \frac{9}{10}x^4z^3y$

## 7. Question

Find each of the following products:

$\left(-\frac{1}{27}a^2b^2\right) \times \left(\frac{9}{2}a^3b^2c^2\right)$

**Answer**

$\frac{-1}{27} \times \frac{9}{2} \times a^2 \times a^3 \times b^2 \times b^2 \times c^2$

$= \frac{-1}{6} \times a^5 \times b^4 \times c^2$

$= \frac{-1}{6}a^5b^4c^2$

## 8. Question

Find each of the following products:

$(-7xy) \times \left(\frac{1}{4}x^2yz\right)$

**Answer**

$-7 \times \frac{1}{4} \times x \times x \times y \times x^2 \times y \times z$

$= \frac{-7}{4} \times x3 \times y^2 \times z$

$= \frac{-7}{4}x^3y^2z$

**9. Question**

Find each of the following products:

$(7ab) \times (-5ab^2c) \times (6abc^2)$

**Answer**

$7 \times -5 \times 6 \times a \times a \times a \times b \times b^2 \times b \times c \times c^2$

$= 210 \times a^3 \times b^4 \times c^3$

$= 210a^3b^4c^3$

**10. Question**

Find each of the following products:

$(-5a) \times (-10a^2) \times (-2a^3)$

**Answer**

$(-5) \times (-10) \times (-2) \times a \times a^2 \times a^3$

$= -100 \times a^6$

$= -100a^6$

**11. Question**

Find each of the following products:

$(-4x^2) \times (-6xy^2) \times (-3yz^2)$

**Answer**

$(-4) \times (-6) - (-3) \times x^2 \times x \times y^2 \times y \times z^2$

$= -72 \times x^3 \times y^3 \times z^2$

$= -72x^3y^3z^2$

**12. Question**

Find each of the following products:

$\left(-\frac{2}{7}a^4\right) \times \left(-\frac{3}{4}a^2b\right) \times \left(-\frac{14}{5}b^2\right)$

**Answer**

$\frac{-2}{7} \times \frac{-3}{4} \times \frac{-14}{5} \times a \times a^2 \times b \times b^2$

$= \frac{-6}{10} \times a^6 \times b^3$

$= \frac{-3}{5}a^6b^3$

**13. Question**

Find each of the following products:

$\left(\frac{7}{9}ab^2\right) \times \left(\frac{15}{7}ac^2b\right) \times \left(-\frac{3}{5}a^2c\right)$

**Answer**

$\frac{7}{9} \times \frac{15}{7} \times \frac{-3}{5} \times a \times a \times a^2 \times b^2 \times b \times c^2 \times c$

$= -a^4 \times b^3 \times c^3$

$= -a^4b^3c^3$

## 14. Question

Find each of the following products:

$\left(\frac{4}{3}u^2vw\right) \times (-5uvw^2) \times \left(\frac{1}{3}v^2wu\right)$

**Answer**

$\frac{4}{3} \times -5 \times \frac{1}{3} \times u^2 \times u \times u \times v \times v \times v^2 \times w \times w^2 \times w$

$= \frac{-20}{9} \times u^4 \times v^4 \times w^4$

$= \frac{-20}{9}u^4v^4w^4$

## 15. Question

Find each of the following products:

$(0.5x) \times \left(\frac{1}{3}xy^2z^4\right) \times (24x^2yz)$

**Answer**

$0.5 \times \frac{1}{3} \times 24 \times x \times x \times x \times y^2 \times y \times x^2 \times z^4 \times z$

$= \frac{12}{3} \times x^4 \times y^3 \times z^5$

$= 4x^4 \times y^3 \times z^5$

$= 4x^4y^3z^5$

## 16. Question

Find each of the following products:

$\left(\frac{4}{3}pq^2\right) \times \left(-\frac{1}{4}p^2r\right) \times (16p^2q^2r^2)$

**Answer**

$\frac{4}{3} \times \frac{1}{4} \times 16 \times p \times p^2 \times p^2 \times q^2 \times q^2 \times r \times r^2$

$= \frac{-16}{3} \times p^5 \times q^4 \times r^3$

$= \frac{-16}{3}p^5q^4r^3$

## 17. Question

Find each of the following products:

$(2.3xy) \times (0.1x) \times (0.16)$

**Answer**

$2.3 \times 0.1 \times 0.16 \times x \times x \times x \times y$

$= 0.0368 \times x^2 \times y$

$= 0.0368x^2y$

**18. Question**

Express each of the following prducts as a monomials and verify the result in each case for x=1:

$(3x) \times (4x) \times (-5x)$

**Answer**

3 × 4 × -5 × x × x × x

$= -60 \times x^3$

$= -60x^3$

**19. Question**

Express each of the following prducts as a monomials and verify the result in each case for x=1:

$(4x^2) \times (-3x) \times \left(\dfrac{4}{5}x^3\right)$

**Answer**

$4 \times -3 \times \dfrac{4}{5} \times x^2 \times x \times x \times x^3$

$= \dfrac{-48}{5} \times x^6$

$= \dfrac{-48}{5}x^6$

**20. Question**

Express each of the following prducts as a monomials and verify the result in each case for x=1:

$(5x^4) \times (x^2)^3 \times (2x)^2$

**Answer**

$5x^4 \times x^6 \times 4 \times x^2$

$= 5 \times 4 \times x^4 \times x^6 \times x^2$

$= 20 \times x^{12}$

$= 20x^{12}$

**21. Question**

Express each of the following prducts as a monomials and verify the result in each case for x=1:

$(x^2)^3 \times (2x) \times (-4x) \times (5)$

**Answer**

$x^6 \times 2x \times (-4x) \times 5$

$= 2 \times -4 \times 5 \times x^6 \times x \times x \times x$

$= -40 \times x^8$

$= -40 x^8$

**22. Question**

Express each of the following prducts as a monomials and verify the result in each case for x=1:

Write down the product of $8x^2y^6$ and$-20xy$ verify the product for x=2.5, y=1

**Answer**

-8 × -2 × $x^2$ × x × x × $y^6$ × y

= 16 × $x^3$ × $y^7$

= $16x^3y^7$

Verification is when, x = 2.5 and y = 1

R.H.S = 16 $(2.5)^3$ × $(1)^7$

= 16 × 15.625

= 250

L.H.S = -8 × $2.5^2$ × $1^6$ × -20 × 1 × 2.5

= 250

Therefore,

L.H.S = R.H.S

## 23. Question

Express each of the following prducts as a monomials and verify the result in each case for x=1:

Evaluate $(3.2x^6y^3) \times (2.1x^2y^2)$ when x=1 and y=0.5

**Answer**

3.2 × 2.1 × $x^6$ × $x^2$ × $y^3$ × $y^2$

= 6.72 × $x^8$ × $y^5$

= $6.72x^8y^5$

Verify:

When x = 1 and y = 0.5

R.H.S = $6.72x^3y^5$

= 6.72 × $1^8$ × $0.5^5$

= 0.21

L.H.S = 3.2 × $1^6$ × $(-.5)^3$ × 2.1 × $1^2$ × $0.5^2$ = 0.21

Therefore,

L.H.S = R.H.S

## 24. Question

Express each of the following prducts as a monomials and verify the result in each case for x=1:

Find the value of $(5x^6) \times (-1.5x^2y^3) \times (-12xy^2)$ when x = 1,y=0.5

**Answer**

5 × -1.5 × -12 × $x^6$ × $x^2$ × x × $y^3$ × $y^2$

= 90 × $x^9$ × $y^5$

= $90x^9y^5$

Verification:

x = 1 and y = 0.5

R.H.S = $90x^9y^5$

= $90 (1)^9 (05)^5$

= 2.8125

L.H.S = 2.8125

Therefore,

L.H.S = R.H.S

**25. Question**

Express each of the following prducts as a monomials and verify the result in each case for x=1:

Evaluate $(2.3a^5b^2) \times (1.2a^2b^2)$ when a=1 and b = 0.5

**Answer**

$2.3a^5b^2 \times 1.2a^2b^2$

= $2.3 \times 1.2 \times a^5 \times a^2 \times b^2 \times b^2$

= $2.76 \times a^7 \times b^4$

= $2.76a^7b^4$

Verification:

a = 1 and b = 0.5

$2.76 a^7 b^4 = 2.76 (1)^7 (0.5)^4$

= $2.76 \times 1 \times 0.0025$

= 0.1725

**26. Question**

Express each of the following prducts as a monomials and verify the result in each case for x=1:

Evaluate $(-8x^2y^6) \times (-20xy)$ for x = 2.5 and y=1.

**Answer**

$-8 \times - 20 \times x^2 \times x \times y^6 \times y$

= $160x^3y^7$

Verify:

When, x = 2.5 and y = 1

R.H.S = $160x^3y^7$

= $160 \times (2.5)^3 \times (1)^7$

= 2500

L.H.S = $- 8 \times 2.5^2 \times 1 \times -20 \times 1 \times 2.5$

= 2500

Therefore,

L.H.S = R.H.S

**27. Question**

Express each of the following products as a monomials and verify the result for x=1, y= 2:

$(-xy^3) \times (yx^3) \times (xy)$

**Answer**

$-x \times x^3 \times x \times y^3 \times y \times y$

$= -x^5 y^5$

Verify:

When x = 1 and y = 2

R.H.S = $-x^5 y^5$

$= (-1)^5 \times 2^5$

$= -1 \times 32$

$= -32$

L.H.S = $(-1) \times 2^3 \times 2 \times 1^3 \times 1 \times 2$

$= -32$

Therefore,

L.H.S = R.H.S

**28. Question**

Express each of the following products as a monomials and verify the result for x=1, y= 2:

$\left(\frac{1}{8} x^2 y^4\right) \times \left(\frac{1}{4} x^4 y^2\right) \times (xy) \times 5$

**Answer**

$\frac{1}{8} \times \frac{1}{4} \times 5 \times x^2 \times x^4 \times x \times y^4 \times y^2 \times y$

$= \frac{5}{32} \times x^6 \times y^6$

$= \frac{5}{32} x^6 y^6$

Verification:

When x = 1 and y = 2

R.H.S $= \frac{5}{32} \times 1^6 \times 2^6$

$= \frac{5}{32} \times 64$

$= 5 \times 2$

$= 10$

L.H.S $= \frac{1}{8} \times 1^2 \times 2^4 \times \frac{1}{4} \times 1^4 \times 2^2 \times 1 \times 2 \times 5$

$= 10$

Therefore,

L.H.S = R.H.S

**29. Question**

Express each of the following products as a monomials and verify the result for x=1, y= 2:

$$\left(\frac{2}{5}a^2b\right) \times \left(-15b^2ac\right) \times \left(-\frac{1}{2}c^2\right)$$

**Answer**

$\frac{2}{5} \times 15 \times \frac{1}{2} \times a^2 \times a \times b \times b^2 \times c \times c^3$

$= 3\ a^3 \times b^3 \times c^3$

$= 3a^3b^3c^3$

**30. Question**

Express each of the following products as a monomials and verify the result for x=1, y= 2:

$$\left(-\frac{4}{7}a^2b\right) \times \left(-\frac{2}{3}b^2c\right) \times \left(-\frac{7}{6}c^2a\right)$$

**Answer**

$\frac{-4}{7} \times \frac{-2}{3} \times \frac{-7}{6} \times a^2 \times a \times b \times b^2 \times c \times c^2$

$= \frac{-4}{9} \times a^3 \times b^3 \times c^3$

$= \frac{-4}{9}a^3b^3c^3$

**31. Question**

Express each of the following products as a monomials and verify the result for x=1, y= 2:

$$\left(\frac{4}{9}abc^3\right) \times \left(-\frac{27}{5}a^3b^3\right) \times \left(-8b^3c\right)$$

**Answer**

$\frac{4}{9} \times \frac{-27}{5} \times -8 \times a \times a^3 \times b \times b^2 \times b^3 \times c^3 \times c$

$= \frac{-96}{5} \times a^4 \times b^6 \times c^4$

$= \frac{-96}{5}a^4b^6c^4$

**32. Question**

Evaluate each of the following when x=2, y -1

$$(2xy) \times \left(\frac{x^2y}{4}\right) \times (x^2) \times (y^2)$$

**Answer**

$2 \times \frac{1}{4} \times x \times x \times x^2 \times x^2 \times y \times y^2 \times y$

$= \frac{1}{2}x^5y^5$

$= \frac{1}{2}x^5y^5$

Verification:

When x = 2 and y = 1

R.H.S $= \frac{1}{2}x^5y^5$

$= \frac{1}{2}(2)^5 \times (-1)^5$

$= \frac{1}{2} \times 32 \times -1$

$= -16$

Therefore,

L.H.S = R.H.S

**33. Question**

Evaluate each of the following when x=2, y -1

$\left(\frac{3}{5}x^2y\right) \times \left(-\frac{15}{4}xy^2\right) \times \left(\frac{7}{9}x^2y^2\right)$

**Answer**

$\frac{3}{5} \times \frac{-15}{4} \times \frac{7}{9} \times x^2 \times x \times x^2 \times y \times y^2 \times y^2$

$= \frac{-7}{4} \times x^5 \times y^5$

$= \frac{7}{4}x^5y^5$

Verification:

When x = 2 and y = -1

R.H.S $= \frac{-7}{4}x^5y^5$

$= \frac{-7}{4}(2)^5 (-1)^5$

$= \frac{-7}{4} \times 32 \times -1$

$= 56$

Therefore,

L.H.S = R.H.S

## Exercise 6.4

**1. Question**

Find the following products:

$2a^3(3a + 5b)$

**Answer**

$2a^3(3a + 5b)$

$= 2a^3 \times 3a + 2a^2 \times 5b$

$= 6 \times a^4 + 10a^3b$

**2. Question**

Find the following products:

$-11a(3a + 2b)$

**Answer**

$-11a(3a + 2b)$

$= (-11a \times 3a) + (-11a \times 2b)$

= -33a$^2$ – 2 × 11 × a × b

= -33a$^2$ – 22ab

## 3. Question

Find the following products:

$-5a(7a - 2b)$

**Answer**

-5a (7a – 2b)

= -5a × 7a – (-5a) × 2b

= -5 × 7 × a × a + 5 × 2 × a × b

= -35a$^2$ + 10ab

## 4. Question

Find the following products:

$-11y^2 (3y + 7)$

**Answer**

-11y$^2$ (3y + 7)

= -11y$^2$ × 3y – 11y$^2$ × 7

= -11 × 3 × y$^2$ × y – 11y$^2$ × 7

= -33y$^3$ – 77y$^2$

## 5. Question

Find the following products:

$\frac{6x}{5}\left(x^3 + y^3\right)$

**Answer**

$\frac{6}{5}$x (x$^3$ + y$^3$)

= $\frac{6}{5}$x × x$^3$ + $\frac{6}{5}$x × y$^3$

= $\frac{6}{5}$x$^4$ + $\frac{6}{5}$xy$^3$

## 6. Question

Find the following products:

$xy\left(x^3 - y^3\right)$

**Answer**

xy (x$^3$ – y$^3$)

= xy × x$^3$ – xy × y$^3$

=x$^4$y – xy$^4$

## 7. Question

Find the following products:

$0.1y\left(0.1x^5 + 0.1y\right)$

**Answer**

$0.1y\ (0.1x^5 + 0.1y)$

$= 0.1y \times 0.1x^5 + 0.1y \times 0.1y$

$= 0.01 \times x^5 \times y + 0.01 \times y^2$

$= 0.01x^5y + 0.01y^2$

## 8. Question

Find the following products:

$\left(-\dfrac{7}{4}ab^2c - \dfrac{6}{25}a^2c^2\right)\left(-50a^2b^2c^2\right)$

**Answer**

$\left(\dfrac{-7}{4}ab^2c - \dfrac{6}{25}a^2c^2\right)(-50a^2b^2c^2)$

$= \dfrac{-7}{4}ab^2c \times -50a^2b^2c^2 - \dfrac{6}{25}a^2c^2 \times -50a^2b^2 \times c^2$

$= \dfrac{7}{4} \times 50 \times a^3 \times b^4 \times c^3 - \dfrac{6}{25} \times - 50 \times a^4 \times b^2 \times c^4$

$= \dfrac{350}{4}a^3b^4c^3 + 12a^4b^2c^4$

$= \dfrac{175}{2}a^3b^4c^3 + 12a^4b^2c^4$

## 9. Question

Find the following products:

$-\dfrac{8}{27}xyz\left(\dfrac{3}{2}xyz^2 - \dfrac{9}{4}xy^2z^3\right)$

**Answer**

$\dfrac{-8}{27}xyz\ (\dfrac{3}{2}xyz^2 - \dfrac{9}{4}xy^2z^3)$

$= \dfrac{-8}{27}xyz \times \dfrac{3}{2}xyz^2 - \dfrac{8}{27}xyz \times \dfrac{-9}{4}xy^2z^3$

$= \dfrac{-4}{9} \times x^2 \times y^2 \times z^3 + \dfrac{2}{3} \times x^2 \times y^3 \times z^4$

$= \dfrac{-4}{9}x^2y^2z^3 + \dfrac{2}{3}x^2y^3z^4$

## 10. Question

Find the following products:

$-\dfrac{4}{27}xyz\left(\dfrac{9}{2}x^2yz - \dfrac{3}{4}xyz^2\right)$

**Answer**

$\dfrac{-4}{7}xyz\ (\dfrac{9}{2}x^2yz - \dfrac{3}{4}xyz^2)$

$= \dfrac{-4}{27}xyz \times \dfrac{9}{2}x^2yz - \dfrac{4}{7}xyz \times \dfrac{-3}{4}xyz^2$

$= \dfrac{-2}{3} \times x^3 \times y^2 \times z^2 + 9 \times x^2 \times y^2 \times z^3$

$$= \frac{-2}{3}x^3y^2z^2 + 9x^2y^2z^3$$

## 11. Question

Find the following products:

$1.5x\left(10x^2y - 100xy^2\right)$

**Answer**

$1.5x\ (10x^2y - 100xy^2)$

$= 1.5x \times 10x^2y - 1.5x \times 100xy^2$

$= 15 \times x^3 \times y - 150 \times x^2 \times y^2$

$= 15x^3y - 150x^2y^2$

## 12. Question

Find the following products:

$4.1xy\left(1.1x - y\right)$

**Answer**

$4.1xy\ (1.1x - y)$

$= 4.1xy \times 1.1x - 4.1xy \times y$

$= 4.51x^2y - 4.1xy^2$

## 13. Question

Find the following products:

$250.5xy\left(xz + \frac{y}{10}\right)$

**Answer**

$250 \times 5\ (x^2yz + \frac{xy*y}{10}$

$= 250\ (5x^2yz + \frac{x*y*y}{2})$

$= 250 \times 5x^2yz + 125xy^2$

## 14. Question

Find the following products:

$\frac{7}{5}x^2y\left(\frac{3}{5}xy^2 + \frac{2}{5}x\right)$

**Answer**

$\frac{7}{5}\ (\frac{3}{5}x^3y^3 + \frac{2}{5}x^3y)$

$= \frac{21}{25}x^3y^3 + \frac{14}{25}x^3y$

## 15. Question

Find the following products:

$\frac{4}{5}a\left(a^2 + b^2 - 3c^2\right)$

**Answer**

$\frac{4}{5}(a^3 + ab^2 - 3ac^2)$

$= \frac{4}{5}a^3 + \frac{4}{5}ab^2 - \frac{12}{5}ac^2$

## 16. Question

Find the product $24x^2(1-2x)$ and evaluate its value for x=3

**Answer**

$24x^2 (1 - 2x)$

$= 24x^2 - 48x^3$

According to question,

When x = 3

$= 24x^2 - 48x^3$

$= 24 (3)^2 - 48 (3)^3$

$= 24 (9) - 48 (27)$

$= 216 - 1296$

$= - 1080$

## 17. Question

Find the product -3y (xy+y$^2$) and find its value for x = 4 and y = 5

**Answer**

$- 3y (xy + y^2)$

$= - 3xy^2 - 3y^3$

According to question:

When x = 4 and y = 5

$= - 3xy^2 - 3y^3$

$= - 3 (4) (5)^2 - 3 (5)^3$

$= - 300 - 375$

$= - 675$

## 18. Question

Multiply $-\frac{3}{2}x^2y^3bx(2x-y)$ and verify the answer for x = 1 and y = 2

**Answer**

$-\frac{3}{2}x^2y^3bx (2x - y)$

$= - 3x^3y^3bx + \frac{3}{2}x^2y^4bx$

$= -3x^4y^3b + \frac{3}{2}x^3y^4b$

According to question:

When x = 1 and y = 2

$= -3 (1)^4 (2)^3 b + \frac{3}{2} (1)^3 (2)^4 b$

$= -3 (8) b + 3 (8) b$

$= 0$

## 19. Question

Multiply the monomial by the binomial and find the value of each for x=-1, y=0.25 and z=0.005:

(i) $15y^2 (2-3x)$

(ii) $-3x (y^2+z^2)$

(iii) $z^2 (x-y)$

(iv) $xz(x+y^2)$

**Answer**

(i) $15y^2 (2 - 3x)$

$= 30y^2 - 45xy^2$

Putting $x = -1$, $y = \frac{25}{100}$ and $z = \frac{5}{1000}$

$= 30 (\frac{25}{100})^2 - 45 (-1) (\frac{25}{100})^2$

$= 30 (\frac{1}{16}) + 45 (\frac{1}{16})$

$= \frac{15}{8} + \frac{45}{16}$

$= \frac{30+45}{16}$

$= \frac{75}{16}$

(ii) $-3x (y^2+z^2)$

Putting $x = -1$, $y = \frac{25}{100}$ and $z = \frac{5}{1000}$

$= -3 (-1) (\frac{25}{100})^2 - 3 (-1) (\frac{5}{1000})^2$

$= \frac{3*25*25}{100*100} + \frac{3*5*5}{1000*1000}$

$= \frac{3}{16} + \frac{3}{40000}$

$= \frac{39}{200}$

(iii) $z^2 (x-y)$

Putting $x = -1$, $y = \frac{25}{100}$ and $z = \frac{5}{1000}$

$z^2 (x - y)$

$= (\frac{5}{1000})^2 (-1 - \frac{25}{100})$

$= (\frac{1}{40000}) (\frac{-5}{4})$

$= \frac{-1}{32000}$

(iv) $xz(x+y^2)$

Putting $x = -1$, $y = \frac{25}{100}$ and $z = \frac{5}{1000}$

$= (-1)^2 \left(\frac{5}{1000}\right) + (-1) \left(\frac{25}{100}\right)^2 \left(\frac{5}{1000}\right)$

$= \frac{1}{200} - \frac{1}{16} \left(\frac{1}{200}\right)$

$= \frac{16-1}{3200}$

$= \frac{3}{640}$

## 20. Question

Simplify:

(i) $2x^2\left(x^3 - x\right) - 3x\left(x^4 + 2x\right) - 2\left(x^4 - 3x^2\right)$

(ii) $x^3y\left(x^2 - 2x\right) + 2xy\left(x^3 - x^4\right)$

(iii) $3a^2 + (a + 2) - 3a(2a + 1)$

(iv) $x(x + 4) + 3x\left(2x^2 - 1\right) + 4x^2 + 4$

(v) $a(b - c) - b(c - a) - c(a - b)$

(vi) $a(b - c) + b(c - a) + c(a - b)$

(vii) $4ab(a - b) - 6a^2\left(b - b^2\right) - 3b^2\left(2a^2 - a\right) + 2ab(b - a)$

(viii) $x^2\left(x^2 + 1\right) - x^3(x + 1) - x\left(x^3 - x\right)$

(ix) $2a^2 + 3a\left(1 - 2a^3\right) + a(a + 1)$

(x) $a^2(2a - 1) + 3a + a^3 - 8$

(xi) $\frac{3}{2}x^2\left(x^2 - 1\right) + \frac{1}{4}x^2\left(x^2 + x\right) - \frac{3}{4}x\left(x^3 - 1\right)$

(xii) $a^2b\left(a - b^2\right) + ab^2\left(4ab - 2a^2\right) - a^3b(1 - 2b)$

(xiii) $a^2b\left(a^3 - a + 1\right) - ab\left(a^4 - 2a^2 + 2a\right) - b\left(a^3 - a^2 - 1\right)$

**Answer**

(i) $2x^2(x^3 - x) - 3x(x^4 + 2x) - 2(x^4 - 3x^2)$

$= 2x^5 - 2x^3 - 3x^5 - 6x^2 - 2x^4 + 6x^2$

$= -x^5 - 2x^4 - 2x^3$

(ii) $x^3y(x^2 - 2x) + 2xy(x^3 - x^4)$

$= x^5y - 2x^4y + 2x^4y - 2x^5y$

$= -x^5y$

(iii) $3a^2 + (a + 2) - 3a(2a + 1) = 3a^2 + a + 2 - 6a^2 - 34$

$= -3a^2 - 2a + 2$

(iv) $x(x + 4) + 3x(2x^2 - 1) + 4x^2 + 4$

$= x^2 + 4x + 6x^3 - 3x + 4x^2 + 4$

$= 6x^3 + 5x^2 + x + 4$

(v) $a(b - c) - b(c - a) - c(a - b)$

$= ab - ac - bc + ab - ca + bc$

= 2ab – 2ac

(vi) a(b – c) + b(c – a) + c(a – b)

= ab – ac + bc – ab + ac – bc

= 0

(vii) $4ab(a – b) – 6a^2(b – b^2) – 3b^2(2a^2 – a) + 2ab(b – a)$

$= 4a^2b – 4ab^2 – 6a^2b + 6a^2b^2 – 6a^2b^2 + 3ab^2 + 2ab^2 – 2a^2b$

$= 3ab^2$

(viii) $x^2(x^2 + 1) – x^3(x + 1) – x(x^3 – x)$

$= x^4 + x^2 – x^4 – x^3 – x^4 + x^2$

$= 2x^2 – 2x^3$

(ix) $2a^2 + 3a (1 – 2a^3) + a(a + 1)$

$= 2a^2 + 3a – 6a^4 + a^2 + a$

$= -6a^4 + 3a^2 + 4a$

(x) $a^2(2a – 1) + 3a + a^3 – 8$

$= 2a^3 – a^2 + 3a + a^3 – 8$

$$(xi)\ \frac{3}{2}x^2(x^2 - 1) + \frac{1}{4}x^2(x^2 + x) - \frac{3}{4}x(x^3 - 1)$$

$= 3a^3 – a^2 + 3a – 8 = \dfrac{3}{2}x^4 - \dfrac{3}{2}x^2 + \dfrac{1}{4}x^4 + \dfrac{1}{4}x^3 + \dfrac{3}{4}x^4 + \dfrac{3}{4}x$    (xii) $a^2b(a – b^2) + ab^2(4ab – 2a^2) – a^3b(1 – 2b)$

$= x^4 - \dfrac{3}{2}x^2 + \dfrac{1}{4}x^3 + \dfrac{3}{4}x$

$= a^3b – a^2b^3 + 4a^2b^3 – 2a^3b^2 – a^3b + 2a^3b^2$

$= -a^2b^3 + 4a^2b^3$

$= 3a^2b^3$

(xiii) $a^2b(a^3 – a + 1) – ab(a^4 – 2a^2 + 2a) – b(a^3 – a^2 – 1)$

$= a^5b – a^3b + a^2b – a^5b + 2a^3b – 2a^2b – ba^3 + a^2b + b$

$= b$

## Exercise 6.5

### 1. Question

Multiply:

$(5x + 3)\,by\,(7x + 2)$

**Answer**

(5x + 3) × (7x + 2)

= 5x (7x + 2) + 3 (7x + 2)

$= 35x^2 + 10x + 21x + 6$

$= 35x^2 + 31x + 6$

### 2. Question

Multiply:

$(2x + 8) \, by \, (x - 3)$

**Answer**

$(2x + 8) \times (x - 3)$

$= 2x \, (x - 3) + 8 \, (x - 3)$

$= 2x^2 - 6x + 8x - 24$

$= 2x^2 - 2x - 24$

**3. Question**

Multiply:

$(7x + y) \, by \, (x + 5y)$

**Answer**

$(7x + y) \times (x + 5y)$

$= 7x \, (x + 5y) + y \, (x + 5y)$

$= 7x^2 + 35xy + xy + 5y^2$

$= 7x^2 + 36xy + 5y^2$

**4. Question**

Multiply:

$(a - 1) \, by \, (0.1a^2 + 3)$

**Answer**

$(a - 1) \times (0.1a^2 + 3)$

$= a \, (0.1a^2 + 3) - 1 \, (0.1a^2 + 3)$

$= 0.1a^3 + 3a - 0.1a^2 - 3$

**5. Question**

Multiply:

$(3x^2 + y^2) \, by \, (2x^2 + 3y^2)$

**Answer**

$(3x^2 + y^2) \times (2x^2 + 3y^2)$

$= 3x^2 \, (2x^2 + 3y^2) + y^2 \, (2x^2 + 3y^2)$

$= 6x^4 + 9x^2y^2 + 2x^2y^2 + 3y^4$

$= 6x^4 + 11x^2y^2 + 3y^4$

**6. Question**

Multiply:

$\left(\frac{3}{5}x + \frac{1}{2}y\right) \, by \, \left(\frac{5}{6}x + 4y\right)$

**Answer**

$\left(\frac{3}{5}x + \frac{1}{2}y\right) \times \left(\frac{5}{6}x + 4y\right)$

$$= \frac{3}{5}x \left(\frac{5}{6}x + 4y\right) + \frac{1}{2}y \left(\frac{5}{6}x + 4y\right)$$

$$= \frac{1}{2}x^2 + \frac{12}{5}xy + \frac{5}{12}xy + 2y^2$$

$$= \frac{1}{2}x^2 + \frac{169}{60}xy + 2y^2$$

## 7. Question

Multiply:

$\left(x^6 - y^6\right)$ by $\left(x^2 + y^2\right)$

**Answer**

$(x^6 - y^6) \times (x^2 + y^2)$

$= x^6 (x^2 + y^2) - y^6 (x^2 + y^2)$

$= x^8 + x^6y^2 - x^2y^6 - y^8$

## 8. Question

Multiply:

$\left(x^2 - y^2\right)$ by $(3a + 2b)$

**Answer**

$(x^2 - y^2) \times (3a + 2b)$

$= x^2 (3a + 2b) - y^2 (3a + 2b)$

$= 3ax^2 + 2bx^2 - 3ay^2 - 2by^2$

## 9. Question

Multiply:

$\left[-3d + (7f)\right]$ by $(5f + f)$

**Answer**

$(- 3d + 7f) \times (5d + f)$

$= -3d (5d + f) + 7f (5d + f)$

$= - 15d^2 - 3df + 35df + 7f^2$

$= - 15d^2 + 32df + 7f^2$

## 10. Question

Multiply:

$(0.8a - 0.5b)$ by $(1.5a - 3b)$

**Answer**

$(0.8a - o.5b) \times (1.5a - 3b)$

$= 0.8a (1.5a - 3b) - 0.5b (1.5a - 3b)$

$= 1.2a^2 - 2.4ab - 7.5ab + 1.5b^2$

$= 1.2a^2 - 9.9ab + 1.5b$

## 11. Question

Multiply:

$(2x^2y^2 - 5xy^2)$ by $(x^2 - y^2)$

**Answer**

$(2x^2y^2 - 5xy^2) \times (x^2 - y^2)$

$= 2x^2y^2 (x^2 - y^2) - 5xy^2 (x^2 - y^2)$

$= 2x^4y^2 - 2x^2y^4 - 5x^3y^2 + 5xy^4$

**12. Question**

Multiply:

$\left(\dfrac{x}{7} + \dfrac{x^2}{2}\right)$ by $\left(\dfrac{2}{5} + \dfrac{9x}{4}\right)$

**Answer**

$\left(\dfrac{x}{7} + \dfrac{x*x}{2}\right) \times \left(\dfrac{2}{5} + \dfrac{9x}{4}\right)$

$= \dfrac{x}{7}\left(\dfrac{2}{5} + \dfrac{9x}{4}\right) + \dfrac{x*x}{2}\left(\dfrac{2}{5} + \dfrac{9x}{4}\right)$

$= \dfrac{2x}{35} + \dfrac{9x*x}{28} + \dfrac{x*x}{5} + \dfrac{9x*x*x}{8}$

$= \dfrac{2x}{35} + \dfrac{73}{140}x^2 + \dfrac{9}{8}x^3$

**13. Question**

Multiply:

$\left(-\dfrac{a}{7} + \dfrac{a^2}{9}\right)$ by $\left(\dfrac{b}{2} - \dfrac{b^2}{3}\right)$

**Answer**

$\left(\dfrac{-a}{7} + \dfrac{a*a}{9}\right) \times \left(\dfrac{b}{2} - \dfrac{b*b}{3}\right)$

$= \dfrac{-a}{7}\left(\dfrac{b}{2} - \dfrac{b*b}{3}\right) + \dfrac{a*a}{9}\left(\dfrac{b}{2} - \dfrac{b*b}{3}\right)$

$= \dfrac{-ab}{14} + \dfrac{a*b*b}{21} + \dfrac{a*a*b}{18} - \dfrac{a*a*b*b}{27}$

**14. Question**

Multiply:

$(3x^2y - 5xy^2)$ by $\left(\dfrac{1}{5}x^2 + \dfrac{1}{3}y^2\right)$

**Answer**

$(3x^2y - 5xy^2) \times \left(\dfrac{1}{5}x^2 + \dfrac{1}{3}y^2\right)$

$= 3x^2y \left(\dfrac{1}{5}x^2 + \dfrac{1}{3}y^2\right) - 5xy^2 \left(\dfrac{1}{5}x^2 + \dfrac{1}{3}y^2\right)$

$= \dfrac{3}{5}x^4y + 3x^2y^3 - x^3y^2 + \dfrac{5}{3}xy^4$

**15. Question**

Multiply:

$\left(2x^2 - 1\right) \text{ by } \left(4x^3 + 5x^2\right)$

**Answer**

$(2x^2 - 1) \times (4x^3 + 5x^2)$

$= 2x^2 (4x^3 + 5x) - 1 (4x^3 + 5x^2)$

$= 8x^5 + 10x^3 - 4x^3 - 5x^2$

$= 8x^5 + 6x^3 - 5x^2$

**16. Question**

Multiply:

$\left(2xy + 3y^2\right)\left(3y^2 - 2\right)$

**Answer**

$(2xy + 3y^2) \times (3y^2 - 2)$

$= 2xy (3y^2 - 2) + 3y^2 (3y^2 - 2)$

$= 6xy^3 - 4xy + 3y^4 - 6y^2$

**17. Question**

Find the following products and verify the result for x=-1, y=-2:

$\left(3x - 5y\right)\left(x + y\right)$

**Answer**

$(3x - 5y) \times (x + y)$

$= x (3x - 5y) + y (3x - 5y)$

$= 3x^2 - 5xy + 3xy - 5y^2$

$= 3x^2 - 2xy - 5y^2$

Putting x = - 1 and y = - 2, we have

$[3 (-1) - 5 (-2)] [(1) + (-2)] = 3 (-1)^2 - 2 (-1) (-2) - 5 (-2)^2$

$(-3 + 10) (-1 - 2) = 3 - 4 - 20$

$- 21 = - 21$

Therefore,

L.H.S = R.H.S

Hence, verified

**18. Question**

Find the following products and verify the result for x=-1, y=-2:

$\left(x^2y - 1\right)\left(3 - 2x^2y\right)$

**Answer**

$x^2y (3 - 2x^2y) - 1 (3 - 2x^2y)$

$= 3x^2y - 2x^4y^2 - 3 + 2x^2y$

$= 2x^4y^2 + 5x^2y - 3$

Putting x = -1 and y = -2, we have

= [(-1)² (-2) – 1] [3 – 2 (-1)² (-2) = [-2 (-1)⁴ (-2)² + 5 (-1)² (2) – 3]

= (-2 – 1) (3 + 4) = - 8 – 10 – 3

-21 = - 21

Therefore,

L.H.S = R.H.S

Hence, verified

**19. Question**

Find the following products and verify the result for x=-1, y=-2:

$$\left(\frac{1}{3}x - \frac{y^2}{5}\right)\left(\frac{1}{3}x + \frac{y^2}{5}\right)$$

**Answer**

$(\frac{1}{3}x)^2 - (\frac{y*y}{5})^2$

$= (\frac{1}{3}x - \frac{y*y}{5})(\frac{1}{3}x + \frac{y*y}{5})$

$= \frac{1}{9}x^2 - \frac{1}{25}y^4$

Putting x = -1 and y = -2, we have

$(\frac{1}{3}(-1) - \frac{(-2)(-25)}{5}) = (\frac{1}{9}(-1)^2 - \frac{-2*-2*-2*-2}{25})$

$= (\frac{-1}{3} - \frac{4}{5})(\frac{-1}{3} + \frac{4}{5}) = (\frac{1}{9} - \frac{16}{25})$

$= (\frac{-17}{15})(\frac{7}{15}) = \frac{-119}{225}$

$= \frac{-119}{225} = \frac{-119}{225}$

Therefore,

L.H.S = R.H.S

Hence, verified

**20. Question**

Simplify:

$x^2 (x + 2y)(x - 3y)$

**Answer**

x² (x² – 3xy + 2xy – 3y²)

= x² (x² – xy – 6y²)

= x⁴ – x³y – 6x²y²

**21. Question**

Simplify:

$(x^2 - 2y^2)(x + 4y) x^2 y^2$

**Answer**

$(x^3 + 4x^2y - 2xy^2 - 8y^3) \times x^2y^2$

$= x^5y^2 + 4x^4y^3 - 2x^3y^4 - 8x^2y^5$

**22. Question**

Simplify:

$a^2b^2(a+2b)(3a+b)$

**Answer**

$a^2b^2 (3a^2 + ab + 6ab + 2b^2)$

$= a^2b^2 (3a^2 + 7ab + 2b^2)$

$= 3a^4b^2 + 7a^3b^3 + 2a^2b^4$

**23. Question**

Simplify:

$x^2(x-y)y^2(x+2y)$

**Answer**

$x^2y^2 (x - y) (x + 2y)$

$= x^2y^2 (x^2 + 2xy - xy - 2y^2)$

$= x^2y^2 (x^2 + xy - 2y^2)$

$= x^4y^2 + x^3y^3 - 2x^2y^4$

**24. Question**

Simplify:

$(x^3 - 2x^2 + 5x - 7)(2x - 3)$

**Answer**

$2x^4 - 4x^3 + 4x^2 - 14x - 3x^3 + 6x^2 - 6x + 21$

$= 2x^4 - 7x^3 + 10x^2 - 20x + 21$

**25. Question**

Simplify:

$(5x+3)(x-1)(3x-2)$

**Answer**

$(5x^2 - 2x - 3) (3x - 2)$

$= 15x^3 - 6x^2 - 9x - 10x^2 + 4x + 6$

$= 15x^3 - 16x^2 - 5x + 6$

**26. Question**

Simplify:

$(5-x)(6-5x)(2-x)$

**Answer**

$(x^2 - 7x + 10) (6 - 5x)$

$= -5x^3 + 35x^2 - 50x + 6x^2 - 42x + 60$

$= -5x^2 + 41x^2 - 92x + 60$

**27. Question**

Simplify:

$\left(2x^2 + 3x - 5\right)\left(3x^2 - 5x + 4\right)$

**Answer**

$6x^4 + 9x^3 - 15x^2 - 10x^3 - 15x^2 + 25x + 8x^2 + 12x - 20$

$= 6x^4 - x^3 - 22x^2 + 37x - 20$

**28. Question**

Simplify:

$\left(3x - 2\right)\left(2x - 3\right) + \left(5x - 3\right)\left(x + 1\right)$

**Answer**

$6x^2 - 9x - 4x + 6 + 5x^2 + 5x - 3x - 3$

$= 11x^2 - 11x + 3$

**29. Question**

Simplify:

$\left(5x - 3\right)\left(x + 2\right) - \left(2x + 5\right)\left(4x - 3\right)$

**Answer**

$5x^2 + 10x - 3x - 6 - 8x^2 + 6x - 20x + 15$

$= -3x^2 - 7x + 9$

**30. Question**

Simplify:

$\left(3x + 2y\right)\left(4x + 3y\right) - \left(2x - y\right)\left(7x - 3y\right)$

**Answer**

$12x^2 + 9xy + 8xy$

$= 12x^2 + 9xy + 8xy + 6y^2 - 14x^2 + 6xy + 7xy - 3y^2$

$= -2x^2 + 30xy + 3y^2$

**31. Question**

Simplify:

$\left(x^2 - 3x + 2\right)\left(5x - 2\right) - \left(3x^2 + 4x - 5\right)\left(2x - 1\right)$

**Answer**

$5x^4 - 15x^2 + 10x - 2x^3 + 6x - 4 - (6x^3 + 8x^2 - 10x - 3x^2 - 4x + 5)$

$= 5x^4 - 15x^2 - 2x^3 + 16x - 4 - 6x^3 - 5x^2 + 14x - 5$

$= 5x^4 - 8x^3 - 20x^2 + 30x - 9$

**32. Question**

Simplify:

$\left(x^3 - 2x^2 + 3x - 4\right)(x - 1) - (2x - 3)\left(x^2 - x + 1\right)$

**Answer**

$x^4 - 2x^3 + 3x^2 - 4x - x^3 + 2x^2 - 3x + 4 - (2x^3 - 2x^2 + 2x - 3x^2 + 3x - 3)$

$= x^4 - 3x^3 + 5x^2 - 7x + 4 - 2x^3 + 5x^2 - 5x + 3$

$= x^4 - 5x^3 + 10x^2 - 12x + 7$

## Exercise 6.6

### 1. Question

Write the following squares of binomials as trinomias:

(i) $(x + 2)^2$

(ii) $(8x + 3b)^2$

(iii) $(2m + 1)^2$

(iv) $\left(9a + \dfrac{1}{6}\right)^2$

(v) $\left(x + \dfrac{x^2}{2}\right)^2$

(vi) $\left(\dfrac{x}{4} - \dfrac{y}{3}\right)$

(vii) $\left(3x - \dfrac{1}{3x}\right)^2$

(viii) $\left(\dfrac{x}{y} - \dfrac{y}{x}\right)^2$

(ix) $\left(\dfrac{3a}{2} - \dfrac{5b}{4}\right)^2$

(x) $\left(a^2b - bc^2\right)^2$

(xi) $\left(\dfrac{2a}{3b} + \dfrac{2b}{3a}\right)^2$

(xii) $\left(x^2 - ay\right)^2$

**Answer**

(i) $(x + 2)^2$

$x^2 + 2\,(x)\,(2) + 2^2$

$= x^2 + 4x + 4$

(ii) $(8x + 3b)^2$

$(8x)^2 + 2\,(8x)\,(3b) + (3b)^2$

$= 16x^2 + 48xb + 9b^2$

(iii) $(2m + 1)^2$

$(2m)^2 + 2\,(2m)\,(1) + 1^2$

$= 4m^2 + 4m + 1$

(iv) $\left(9a + \dfrac{1}{6}\right)^2$

$(9a)^2 + 2\,(9a)\left(\dfrac{1}{6}\right) + \left(\dfrac{1}{6}\right)^2$

$= 81a^2 + 3a + \dfrac{1}{36}$

(v) $\left(x + \dfrac{x^2}{2}\right)^2$

$(x)^2 + 2\,(x)\left(\dfrac{x*x}{2}\right) + \left(\dfrac{x*x}{2}\right)^2$

$= x^2 + x^3 + \dfrac{1}{4}x^4$

(vi) $\left(\dfrac{x}{4} - \dfrac{y}{3}\right)$

$\left(\dfrac{x}{4}\right)^2 - 2\left(\dfrac{x}{4}\right)\left(\dfrac{y}{3}\right) + \left(\dfrac{y}{3}\right)^2$

$= \dfrac{1}{16}x^2 - \dfrac{xy}{6} + \dfrac{1}{9}y^2$

(vii) $\left(3x - \dfrac{1}{3x}\right)^2$

$(3x)^2 - 2\,(3x)\left(\dfrac{1}{3x}\right) + \left(\dfrac{1}{3x}\right)^2$

$= 9x^2 - 2 + \dfrac{1}{9*x*x}$

(viii) $\left(\dfrac{x}{y} - \dfrac{y}{x}\right)^2$

$\left(\dfrac{x}{y}\right)^2 - 2\left(\dfrac{x}{y}\right)\left(\dfrac{y}{x}\right) + \left(\dfrac{y}{x}\right)^2$

$= \dfrac{x*x}{y*y} - 2 + \dfrac{y*y}{x*x}$

(ix) $\left(\dfrac{3a}{2} - \dfrac{5b}{4}\right)^2$

$\left(\dfrac{3a}{2}\right)^2 - 2\left(\dfrac{3a}{2}\right)\left(\dfrac{5b}{4}\right) + \left(\dfrac{5b}{4}\right)^2$

$= \dfrac{9}{4}a^2 - \dfrac{15}{4}ab + \dfrac{25}{16}b$

(x) $\left(a^2b - bc^2\right)^2$

$(a^2b)^2 - 2\,(a^2b)\,(bc^2) + (bc^2)^2$

$= a^4b^2 - 2a^2b^2c^2 + b^2c^4$

(xi) $\left(\dfrac{2a}{3b} + \dfrac{2b}{3a}\right)^2$

$\left(\dfrac{2a}{3b}\right)^2 + 2\left(\dfrac{2a}{3b}\right)\left(\dfrac{2b}{3a}\right) + \left(\dfrac{2b}{3a}\right)^2$

$= \dfrac{4*a*a}{9*b*b} + \dfrac{8}{9}a + \dfrac{4*b*b}{9*a*a}$

**(xii)** $\left(x^2 - ay\right)^2$

$(x^2)^2 - 2\,(x^2)\,(ay) + (ay)^2$

$= x^4 - 2x^2ay + a^2y^2$

## 2. Question

Find the product of the following binomials:

(i) $(2x + y)\,(2x + y)$

(ii) $(a + 2b)\,(a - 2b)$

(iii) $\left(a^2 + bc\right)\left(a^2 - bc\right)$

(iv) $\left(\dfrac{4x}{5} - \dfrac{3y}{4}\right)\left(\dfrac{4x}{5} + \dfrac{3y}{4}\right)$

(v) $\left(2x + \dfrac{3}{y}\right)\left(2x - \dfrac{3}{4}\right)$

(vi) $\left(2a^3 + b^3\right)\left(2a^3 - b^3\right)$

(vii) $\left(x^4 + \dfrac{2}{x^2}\right)\left(x^4 - \dfrac{2}{x^2}\right)$

(viii) $\left(x^3 + \dfrac{1}{x^3}\right)\left(x^3 - \dfrac{1}{x^3}\right)$

## Answer

(i) $(2x + y)\,(2x + y)$

$2x\,(2x + y) + y\,(2x + y)$

$= 4x^2 + 2xy + 2xy + 3y$

$= 4x^2 + 4xy + 3y$

(ii) $(a + 2b)\,(a - 2b)$

$a\,(a - 2b) + 2b\,(a - 2b)$

$= a^2 - 2ab + 2ab - 4b^2$

$= a^2 - 4b^2$

(iii) $\left(a^2 + bc\right)\left(a^2 - bc\right)$

$a^2\,(a^2 - bc) + bc\,(a^2 - bc)$

$= a^4 - a^2bc + bca^2 - b^2c^2$

$= a^4 - b^2c^2$

(iv) $\left(\dfrac{4x}{5} - \dfrac{3y}{4}\right)\left(\dfrac{4x}{5} + \dfrac{3y}{4}\right)$

$\dfrac{4x}{5}\,(\dfrac{4x}{5} + \dfrac{3y}{4}) - \dfrac{3y}{4}\,(\dfrac{4x}{5} + \dfrac{3y}{4})$

$= \dfrac{16}{25}x^2 + \dfrac{12}{20}yx - \dfrac{12xy}{20} - \dfrac{9*y*y}{16}$

$= \dfrac{16}{25}x^2 - \dfrac{9}{16}y^2$

(v) $\left(2x + \dfrac{3}{y}\right)\left(2x - \dfrac{3}{4}\right)$

$2x\left(2x - \dfrac{3}{y}\right) + \dfrac{3}{y}\left(2x - \dfrac{3}{y}\right)$

$= 4x^2 - \dfrac{6x}{y} + \dfrac{6x}{y} - \dfrac{9}{y*y}$

$= 4x^2 - \dfrac{9}{y*y}$

(vi) $\left(2a^3 + b^3\right)\left(2a^3 - b^3\right)$

$2a^3\left(2a^3 - b^3\right) + b^3\left(2a^3 - b^3\right)$

$= 4a^6 - 2a^3b^3 + 2a^3b^3 - b^6$

$= 4a^6 - b^6$

(vii) $\left(x^4 + \dfrac{2}{x^2}\right)\left(x^4 - \dfrac{2}{x^2}\right)$

$x^4\left(x^4 - \dfrac{2}{x*x}\right) + \dfrac{2}{x*x}\left(x^4 - \dfrac{2}{x*x}\right)$

$= x^8 - 2x^2 + 2x^2 - \dfrac{4}{x*x*x*x}$

$= \left(x^8 - \dfrac{4}{x*x*x*x}\right)$

(viii) $\left(x^3 + \dfrac{1}{x^3}\right)\left(x^3 - \dfrac{1}{x^3}\right)$

$x^3\left(x^3 - \dfrac{1}{x*x*x}\right) + \dfrac{1}{x*x*x}\left(x^3 - \dfrac{1}{x*x*x}\right)$

$= x^6 - 1 + 1 - \dfrac{1}{x*x*x*x*x*x}$

$= x^6 - \dfrac{1}{x*x*x*x*x*x}$

## 3. Question

Using the formula for squaring a binomial, evaluate the following:

(i) $(102)^2$

(ii) $(99)^2$

(iii) $(1001)^2$

(iv) $(999)^2$

(v) $(703)^2$

**Answer**

(i) $(102)^2$

This can be written as:

$(100 + 2)^2$

$= (100)^2 + 2(100)(2) + 2^2$

$= 10000 + 400 + 4$

$= 10404$

(ii) $(99)^2$

This can be written as:

$(100 - 1)^2$

$= (100)^2 - 2(100)(1) + 1^2$

$= 10000 - 200 + 1$

$= 9801$

(iii) $(1001)^2$

This can be written as:

$(1000 + 1)^2$

$= (1000)^2 + 2(1000)(1) + 1^2$

$= 1000000 + 2000 + 1$

$= 1002001$

(iv) $(999)^2$

This can be written as:

$(1000 - 1)^2$

$= (1000)^2 - 2(1000)(1) + 1^2$

$= 1000000 - 2000 + 1$

$= 998001$

(v) $(703)^2$

This can be written as:

$(700 + 3)^2$

$= (700)^2 + 2(700)(3) + 3^2$

$= 490000 + 4200 + 9$

$= 494209$

## 4. Question

Simplify the following using the formula: $(a - b)(a + b) = a^2 - b^2$ :

(i) $(82)^2 - (18)^2$

(ii) $(467)^2 - (33)^2$

(iii) $(79)^2 - (69)^2$

(iv) $197 \times 203$

(v) $113 \times 87$

(vi) $95 \times 105$

(vii) $1.8 \times 2.2$

(viii) $9.8 \times 10.2$

**Answer**

(i) $(82)^2 - (18)^2$

Using formula:

$(a - b)(a + b) = a^2 - b^2$, we get

$= (82 - 18)(82 + 18)$

$= 64 \times 100$

$= 6400$

(ii) $(467)^2 - (33)^2$

Using formula:

$(a - b)(a + b) = a^2 - b^2$, we get

$= (467 - 33)(467 + 33)$

$= (434)(500)$

$= 217000$

(iii) $(79)^2 - (69)^2$

Using formula:

$(a - b)(a + b) = a^2 - b^2$, we get

$= (79 + 69)(79 - 69)$

$= (148)(10)$

$= 1480$

(iv) $197 \times 203$

Using formula:

$(a - b)(a + b) = a^2 - b^2$, we get

$= (200 - 3)(200 + 3)$

$= (200)^2 - (3)^2$

$= 40000 - 9$

$= 39991$

(v) $113 \times 87$

Using formula:

$(a - b)(a + b) = a^2 - b^2$, we get

$= (100 + 3)(100 - 3)$

$= (100)^2 - (3)^2$

$= 10000 - 9$

$= 9991$

(vi) $95 \times 105$

Using formula:

$(a - b)(a + b) = a^2 - b^2$, we get

$= (100 - 5)(100 + 5)$

$= (100)^2 - (5)^2$

= 10000 – 25

= 9975

(vii) $1.8 \times 2.2$

Using formula:

$(a - b)(a + b) = a^2 - b^2$, we get

= (2- 0.2) (2 + 0.2)

= $(2)^2 - (0.2)^2$

= 4 – 0.04

= 3.96

(viii) $9.8 \times 10.2$

Using formula:

$(a - b)(a + b) = a^2 - b^2$, we get

= (10 – 0.2) (10 + 0.2)

= $(10)^2 - (0.2)^2$

= 100 – 0.04

= 90.96

## 5. Question

Simplify the following using the indentities:

(i) $\dfrac{58^2 - 42^2}{16}$

(ii) $178 \times 178 - 22 \times 22$

(iii) $\dfrac{198 \times 198 - 102 \times 102}{96}$

(iv) $1.73 \times 1.73 - 0.27 \times 0.27$

(v) $\dfrac{8.63 \times 8.63 - 1.37 \times 1.37}{0.726}$

**Answer**

(i) $\dfrac{58^2 - 42^2}{16}$

$\dfrac{(58 - 42)(58 + 42)}{4 * 4}$

$= \dfrac{16\,(100)}{16}$

= 100

(ii) $178 \times 178 - 22 \times 22$

$(178)^2 - (22)^2$

= (178 + 22) (178 – 22)

= 200 × 156

= 31200

(iii) $\dfrac{198 \times 198 - 102 \times 102}{96}$

$\dfrac{(198 - 102)(198 + 102)}{96}$

$= \dfrac{96 * 300}{96}$

$= 300$

(iv) $1.73 \times 1.73 - 0.27 \times 0.27$

$(1.73) - (0.27)$

$= (1.73 + 0.27)(1.73 - 0.27)$

$= 2 (1.46)$

$= 2.92$

(v) $\dfrac{8.63 \times 8.63 - 1.37 \times 1.37}{0.726}$

$\dfrac{(8.63 + 1.37)(8.63 - 1.37)}{0.726}$

$= \dfrac{10 * 7.26}{0.726}$

$= 100$

## 6. Question

Find the value of x, if:

(i) $4x = (52)^2 - (48)^2$

(ii) $14x = (47)^2 - (33)^2$

(iii) $5x = (50)^2 - (40)^2$

**Answer**

(i) $4x = 52^2 - 48^2$

$4x = (52 - 48)(52 + 48)$

$4x = 4 \times 100$

$4x = 400$

$x = 100$

(ii) $14x = (47)^2 - (33)^2$

$14x = (47 - 33)(47 + 33)$

$14x = 14 \times 80$

$x = 80$

(iii) $5x = (50)^2 - (40)^2$

Using formula:

$a^2 - b^2 = (a - b)(a + b)$, we get

$5x = (50 - 40)(50 + 40)$

$5x = 10 \times 90$

$5x = 900$

$x = 180$

## 7. Question

If $x + \dfrac{1}{x} = 20$, find the value of $x^2 + \dfrac{1}{x^4}$.

**Answer**

Given that,

$x + \dfrac{1}{x} = 20$

Squaring both sides, we get

$(x + \dfrac{1}{x})^2 = (20)^2$

$x^2 + 2 \times x \times \dfrac{1}{x} + (\dfrac{1}{x})^2 = 400$

$x^2 + 2 + \dfrac{1}{x*x} = 400$

$x^2 + \dfrac{1}{x*x} = 398$

## 8. Question

If $x - \dfrac{1}{x} = 3$, find the values of $x^2 + \dfrac{1}{x^2}$ and $x^4 + \dfrac{1}{x^4}$.

**Answer**

(i) Given that,

$x - \dfrac{1}{x} = 3$

Squaring both sides, we get

$(x - \dfrac{1}{x})^2 = (3)^2$

$x^2 - 2 \times x \times \dfrac{1}{x} + (\dfrac{1}{x})^2 = 9$

$x^2 - 2 + \dfrac{1}{x*x} = 9$

$x^2 + \dfrac{1}{x*x} = 11$

(ii) Squaring both sides, we get

$(x^2 + \dfrac{1}{x*x})^2 = (11)^2$

$(x^2)^2 + 2 \times x^2 \times \dfrac{1}{x*x} + (\dfrac{1}{x*x})^2 = 121$

$x^4 + 2 + \dfrac{1}{x*x*x*x} = 121$

$x^4 + \dfrac{1}{x*x*x*x} = 119$

## 9. Question

If $x^2 + \dfrac{1}{x^2} = 18$, find the values of $x + \dfrac{1}{x}$ and $x - \dfrac{1}{x}$.

**Answer**

$x^2 + \frac{1}{x*x} = 18$

Adding 2 on both sides, we get

$x^2 + \frac{1}{x*x} + 2 = 18 + 2$

$x^2 + \frac{1}{x*x} + 2 \times x \times \frac{1}{x} = 20$

$(x + \frac{1}{x})^2 = 20$

$x + \frac{1}{x} = 2\sqrt{5}$

Given that,

$x^2 + \frac{1}{x*x} = 18$

Subtracting 2 from both sides, we get

$x^2 + \frac{1}{x*x} - 2 \times x \times \frac{1}{x} = 18 - 2$

$(x - \frac{1}{x})^2 = 16$

$x - \frac{1}{x} = 4$

## 10. Question

If x+y = 4 and xy=2, find the value of $x^2+y^2$

**Answer**

Given that,

x + y = 4 and xy=2

We take the equation: x + y = 4 and on squaring both sides, we get

$(x + y)^2 = 4^2$

$x^2 + y^2 + 2xy = 16$

$x^2 + y^2 + 2(2) = 16$  (Because xy=2 is given)

$x^2 + y^2 + 4 = 16$

$x^2 + y^2 = 16 - 4$

$x^2 + y^2 = 12$

Therefore, the value of $x^2 + y^2$ is 12

## 11. Question

If x- y = 7 and xy = 9, find the value fo $x^2+y^2$

**Answer**

Given that, x – y = 7

Squaring both sides, we get

$(x - y)^2 = (7)^2$

$x^2 + y^2 - 2xy = 49$

Its given that xy = 9,

$x^2 + y^2 - 2 (9) = 49$

$x^2 + y^2 = 49 + 18$

$x^2 + y^2 = 67$

## 12. Question

If $3x+5y = 11$ and $xy = 2$, find the value of $9x^2+25y^2$

**Answer**

Given that,

$3x + 5y = 11$

Squaring both sides, we get

$(3x + 5y)^2 = (11)^2$

$(3x)^2 + (5y)^2 + 2 (3x) (5y) = 121$

$9x^2 + 25y^2 + 30xy = 121$

$9x^2 + 25y^2 + 30 (2) = 121$

$9x^2 + 25y^2 = 121 - 60$

$9x^2 + 25y^2 = 61$

## 13. Question

Find the values of the following expressions:

(i) $16x^2 + 24x + 9,$ when $x = \dfrac{7}{4}$

(ii) $64x^2 + 81y^2 + 144xy,$ when $x = 11$ and $y = \dfrac{4}{3}$

(iii) $81x^2 + 16y^2 - 72xy,$ when $x = \dfrac{2}{3}$ and $y = \dfrac{3}{4}$

**Answer**

(i) $16x^2 + 24x + 9,$ when $x = \dfrac{7}{4}$

$(4x)^2 + 2 (4x) (3) + 3^2$

$= (4x + 3)^2$

Putting $x = \dfrac{7}{4}$

$= [4 \left(\dfrac{7}{4}\right) + 3]^2$

$= (7 + 3)^2$

$= 100$

(ii) $64x^2 + 81y^2 + 144xy,$ when $x = 11$ and $y = \dfrac{4}{3}$

$(8x)^2 + 2 (8x) (9y) + (9y)^2$

$= (8x + 9y)^2$

Putting $x = 11$ and $y = \dfrac{4}{3}$

$= [8 (11) + 9 \left(\frac{4}{3}\right)]^2$

$= (88 + 12)^2$

$= (100)^2$

$= 10000$

(iii) $81x^2 + 16y^2 - 72xy$, when $x = \frac{2}{3}$ and $y = \frac{3}{4}$

$(9x)^2 + (4y)^2 - 2 (9x) (4y)$

$= (9x - 4y)^2$

Putting $x = \frac{2}{3}$ and $y = \frac{3}{4}$

$= [9 \left(\frac{2}{3}\right) - 4 \left(\frac{3}{4}\right)]^2$

$= (6 - 3)^2$

$= 3^2$

$= 9$

## 14. Question

If $x + \frac{1}{x} = 9$, find the value of $x^4 + \frac{1}{x^4}$

**Answer**

Given that,

$x + \frac{1}{x} = 9$

Squaring both sides, we get

$(x + \frac{1}{x})^2 = 9^2$

$x^2 + \frac{1}{x*x} + 2 = 81$

$x^2 + \frac{1}{x*x} = 79$

Again,

Squaring both sides, we get

$(x^2 + \frac{1}{x*x})^2 = 79^2$

$x^4 + \frac{1}{x*x*x*x} + 2 = 6241$

$x^4 + \frac{1}{x*x*x*x} = 6239$

## 15. Question

If $x + \frac{1}{x} = 12$, find the value of $x - \frac{1}{x}$.

**Answer**

Given that,

$x + \frac{1}{x} = 12$

Squaring both sides, we get

$(x + \frac{1}{x})^2 = 12^2$

$x^2 + (\frac{1}{x})^2 + 2 \times x \times \frac{1}{x} = 144$

$x^2 + \dfrac{1}{x^2} = 142$

Subtract 2 from both sides, we get

$x^2 + \frac{1}{x*x} - 2 \times x \times \frac{1}{x} = 142 - 2$

$(x - \frac{1}{x})^2 = 140$

$x - \frac{1}{x} = \pm \sqrt{140}$

## 16. Question

If 2x+3y=14 and 2x-3y=2, find value of xy. [Hint: Use $(2x+3y)^2 - (2x-3y)^2 = 24xy$]

**Answer**

Given that,

2x + 3y = 14...............(1)

2x – 3y = 2.................(2)

Now, on squaring both the equation and subtracting (2) from (1), we get,

$(2x + 3y)^2 - (2x - 3y)^2 = (14)^2 - (2)^2$

$4x^2 + 9y^2 + 12xy - 4x^2 - 9y^2 + 12xy = 196 - 4$

(The positive and negative terms gets cancelled)

24 xy = 192

xy = 8

**Therefore, the value of "xy"is 8.**

## 17. Question

if $x^2+y^2 = 29$ and xy = 2, find the value of

(i) x+y

(ii) x-y

(iii) $x^4+y^4$

**Answer**

(i) x+y

Given that,

$x^2 + y^2 = 29$

$x^2 + y^2 + 2xy - 2xy = 29$

$(x + y)^2 - 2 (2) = 29$

$(x + y)^2 = 29 + 4$

$x + y = \pm\sqrt{33}$

(ii) x-y

$x^2 + y^2 = 29$

$x^2 + y^2 + 2xy - 2xy = 29$

$(x - y)^2 + 2 (2) = 29$

$(x - y)^2 + 4 = 29$

$(x - y)^2 = 25$

$(x - y) = \pm 5$

(iii) $x^4 + y^4$

$x^2 + y^2 = 29$

Squaring both sides, we get

$(x^2 + y^2)^2 = (29)^2$

$x^4 + y^4 + 2x^2y^2 = 841$

$x^4 + y^4 + 2 (2)^2 = 841$

$x^4 + y^4 = 841 - 8$

$x^4 + y^4 = 833$

## 18. Question

What must be added each of the following expression to make it a whole square?

(i) $4x^2 - 12x + 7$

(ii) $4x^2 - 20x + 20$

## Answer

(i) $4x^2 - 12x + 7$

$(2x)^2 - 2 (2x) (3) + 3^2 - 3^2 + 7$

$= (2x - 3)^2 - 9 + 7$

$= (2x - 3)^2 - 2$

Hence, 2 must be added to the expression in order to make a whole square

(ii) $4x^2 - 20x + 20$

$(2x)^2 - 2 (2x) (5) + 5^2 - 5^2 + 20$

$= (2x - 5)^2 - 25 + 20$

$= (2x - 5)^2 - 5$

Hence, 5 must be added to the expression in order to make it a whole square

## 19. Question

Simplify:

(i) $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$

(ii) $(2x - 1)(2x + 1)1(4x^2 + 1)(16x^4 + 1)$

(iii) $(7m - 8n)^2 + (7m + 8n)^2$

(iv) $(2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$

(v) $(m^2 - n^2m)^2 + 2m^3n^2$

**Answer**

(i) $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$

$(x^2 - y^2)(x^2 + y^2)(x^4 + y^4)$

$= [(x^2)^2 - (y^2)^2](x^4 + y^4)$

$= (x^4 - y^4)(x^4 - y^4)$

$= [(x^4)^2 - (y^4)^2]$

$= x^8 - y^8$

(ii) $(2x - 1)(2x + 1)1(4x^2 + 1)(16x^4 + 1)$

$[(2x)^2 - (1)^2](4x^2 + 1)(16x^4 + 1)$

$= (4x^2 - 1)(4x^2 + 1)(16x^4 + 1)1$

$= [(4x^2)^2 - (1)^2](16x^4 + 1)1$

$= (16x^4 - 1)(16x^4 + 1)1$

$= [(16x^4)^2 - (1)^2]1$

$= 256x^8 - 1$

(iii) $(7m - 8n)^2 + (7m + 8n)^2$

$(7m)^2 + (8n)^2 - 112mn + (7m)^2 + (8n)^2 + 112mn$

$= 49m^2 + 64n^2 + 49m^2 + 64n^2$

$= 98m^2 + 64n^2 + 64n^2$

$= 98m^2 + 128n^2$

(iv) $(2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$

$(2.5p)^2 + (1.5q)^2 - 2(2.5p)(1.5q) - (1.5p)^2 - (2.5q)^2 + 2(1.5p)(2.5q)$

$= 6.25p^2 + 2.25q^2 - 2.25p^2 - 6.25q^2$

$= 4p^2 - 6.25q^2 + 2.25q^2$

$= 4p^2 - 4q^2$

$= 4(p^2 - q^2)$

(v) $(m^2 - n^2m)^2 + 2m^3n^2$

$(m^2)^2 - 2(m^2)(n^2)(m) + (n^2m)^2 + 2m^3n^2$

$= m^4 - 2m^3n^2 + (n^2m)^2 + 2m^3n^2$

$= m^4 + n^4m^2 - 2m^3n^2 + 2m^3n^2$

$= m^4 + m^2n^4$

$= m^2 (m^2 + n^4)$

**20. Question**

Show that:

(i) $(3x + 7)^2 - 84x = (3x - 7)^2$

(ii) $(9a - 5b)^2 + 180ab = (9a + 5b)^2$

(iii) $\left(\dfrac{4m}{3} - \dfrac{3n}{4}\right)^2 + 2mn = \dfrac{16m^2}{9} + \dfrac{9n^2}{16}$

(iv) $(4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$

(v) $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$

**Answer**

(i) $(3x + 7)^2 - 84x = (3x - 7)^2$

L.H.S = $(3x + 7)^2 - 84x$

= $(3x)^2 + (7)^2 + 2 (3x) (7) - 84x$

= $(3x)^2 + (7)^2 + 42x - 84x$

= $(3x)^2 + (7)^2 - 42x$

= $(3x)^2 + (7)^2 - 2 (3x) (7)$

= $(3x - 7)^2$

= R.H.S

Hence, proved

(ii) $(9a - 5b)^2 + 180ab = (9a + 5b)^2$

L.H.S = $(9a - 5b)^2 + 180ab$

= $(9a)^2 + (5b)^2 - 2 (9a) (5b) + 180ab$

= $(9a)^2 6 (5b)^2 - 90ab + 180ab$

= $(9a)^2 + (5b)^2 + 9ab$

= $(9a)^2 + (5b)^2 + 2 (9a) (5b)$

= $(9a + 5b)^2$

= R.H.S

Hence, proved

(iii) $\left(\dfrac{4m}{3} - \dfrac{3n}{4}\right)^2 + 2mn = \dfrac{16m^2}{9} + \dfrac{9n^2}{16}$

L.H.S = $(\dfrac{4m}{3} - \dfrac{3n}{4})^2 + 2mn$

= $(\dfrac{4m}{3})^2 + (\dfrac{3n}{4})^2 - 2mn + 2mn$

= $(\dfrac{4m}{3})^2 + (\dfrac{3n}{4})^2$

= $\dfrac{16}{9}m^2 + \dfrac{9}{16}n^2$

= R.H.S

Hence, verified

(iv) $(4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$

L.H.S = $(4pq + 3q)^2 - (4pq - 3q)^2$

= $(4pq)^2 + (3q)^2 + 2(4pq)(3q) - (4pq)^2 - (3q)^2 + 24pq^2$

= $24pq^2 + 24pq^2$

= $48pq^2$

Hence, proved

(v) $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$

L.H.S = $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a)$

Using identity:

$(a - b)(a + b) = a^2 - b^2$

We get,

= $(a^2 - b^2) + (b^2 - c^2) + (c^2 - a^2)$

= $a^2 - b^2 + b^2 - c^2 + c^2 - a^2$

= 0

= R.H.S

Hence, verified

## Exercise 6.7

**1. Question**

Find the following products:

(i) $(x + 4)(x + 7)$ (ii) $(x - 11)(x + 4)$

(iii) $(x + 7)(x - 5)$ (iv) $(x - 3)(x - 2)$

(v) $(y^2 - 4)(y^2 - 3)$ (vi) $\left(x + \dfrac{4}{3}\right)\left(x + \dfrac{3}{4}\right)$

(vii) $(3x + 5)(3x + 11)$ (viii) $(2x^2 - 3)(2x^2 + 5)$

(ix) $(z^2 + 2)(z^2 - 3)$ (x) $(3x - 4y)(2x - 4y)$

(xi) $(3x^2 - 4xy)(3x^2 - 3xy)$ (xii) $\left(x + \dfrac{1}{5}\right)(x + 5)$

(xiii) $\left(z + \dfrac{3}{4}\right)\left(z + \dfrac{4}{3}\right)$ (xiv) $(x^2 + 4)(x^2 + 9)$

(xv) $(y^2 + 12)(y^2 + 6)$ (xvi) $(y^2 + \tfrac{5}{7})(y^2 - \tfrac{14}{5})$

(xvii) $(p^2 + 16)\left(p^2 - \dfrac{1}{4}\right)$

**Answer**

(i) $(x + 4)(x + 7)$

x (x + 7) + 4 (x + 7)

= $x^2$ + 7x + 4x + 28

= $x^2$ + 11x + 28

(ii) $(x-11)(x+4)$

x (x + 4) – 11 (x + 4)

= $x^2$ + 4x – 11x – 44

= $x^2$ – 7x - 44

(iii) $(x+7)(x-5)$

x (x – 5) + 7 (x – 5)

= $x^2$ – 5x + 7x – 35

= $x^2$ + 2x - 35

(iv) $(x-3)(x-2)$

x (x – 2) – 3 (x – 2)

= $x^2$ – 2x – 3x + 6

= $x^2$ – 5x + 6

(v) $(y^2-4)(y^2-3)$

$y^2$ ($y^2$ – 3) – 4 ($y^2$ – 3)

= $y^4$ – $3y^2$ – $4y^2$ + 12

= $y^4$ – $7y^2$ + 12

(vi) $\left(x+\dfrac{4}{3}\right)\left(x+\dfrac{3}{4}\right)$

x (x + $\frac{3}{4}$) + $\frac{4}{3}$ (x + $\frac{3}{4}$)

= $x^2$ + $\dfrac{3x}{4}$ + $\dfrac{4x}{3}$ + $\dfrac{12}{12}$

= $x^2$ + $\dfrac{3x}{4}$ + $\dfrac{4x}{3}$ + 1

= $x^2$ + $\dfrac{25x}{12}$ + 1

(vii) $(3x+5)(3x+11)$

3x (3x + 11) + 5 (3x + 11)

= $9x^2$ + 33x + 15x + 55

= $9x^2$ + 48x + 55

(viii) $(2x^2-3)(2x^2+5)$

$2x^2$ ($2x^2$ – 5) – 3 ($2x^2$ – 5)

= $4x^4$ – $10x^2$ – $6x^2$ + 15

= $4x^4$ – $16x^2$ + 15

(ix) $(z^2+2)(z^2-3)$

$z^2 (z^2 - 3) + 2 (z^2 - 3)$

$= z^4 - 3z^2 + 2z^2 - 6$

$= z^4 - z^2 - 6$

(x) $(3x - 4y)(2x - 4y)$

$3x (2x - 4y) - 4y (2x - 4y)$

$= 6x^2 - 12xy - 8xy + 16y^2$

$= 6x^2 - 20xy + 16y^2$

(xi) $(3x^2 - 4xy)(3x^2 - 3xy)$

$3x^2 (3x^2 - 3xy) - 4xy (3x^2 - 3xy)$

$= 9x^4 - 9x^3y - 12x^3y + 12x^2y^2$

$= 9x^4 - 21x^3y + 12x^2y^2$

(xii) $\left(x + \frac{1}{5}\right)(x + 5)$

$x \left(x + \frac{1}{5}\right) + 5 \left(x + \frac{1}{5}\right)$

$= x^2 + \frac{x}{5} + 5x + 1$

$= x^2 + \frac{26}{5}x + 1$

(xiii) $\left(z + \frac{3}{4}\right)\left(z + \frac{4}{3}\right)$

$z \left(z + \frac{4}{3}\right) + \frac{3}{4} \left(z + \frac{4}{3}\right)$

$= z^2 + \frac{4}{3}z + \frac{3}{4}z + \frac{12}{12}$

$= z^2 + \frac{4}{3}z + \frac{3}{4}z + 1$

$= z^2 + \frac{25}{12}z + 1$

(xiv) $(x^2 + 4)(x^2 + 9)$

$x^2 (x^2 + 9) + 4 (x^2 + 9)$

$= x^4 + 9x^2 + 4x^2 + 36$

$= x^4 + 13x^2 + 36$

(xv) $(y^2 + 12)(y^2 + 6)$

$y^2 (y^2 + 6) + 12 (y^2 + 6)$

$= y^4 + 6y^2 + 12y^2 + 72$

$= y^4 + 18y^2 + 72$

(xvi) $(y^2 + \frac{5}{7})(y^2 - \frac{14}{5})$

$y^2 (y^2 - \frac{14}{5}) + \frac{5}{7}(y^2 - \frac{14}{5})$

$= y^4 - \frac{14}{5}y^2 + \frac{5}{7}y^2 - 2$

$= y^4 - \frac{73}{35}y^2 - 2$

(xvii) $(p^2 + 16)\left(p^2 - \frac{1}{4}\right)$

$p^2 \left(p^2 - \frac{1}{4}\right) + 16 \left(p^2 - \frac{1}{4}\right)$

$= p^4 - \frac{1}{4}p^2 + 16p^2 - 4$

$= p^4 - \frac{63}{4}p^2 - 4$

**2. Question**

Evaluate the following:

(i) $102 \times 106$

(ii) $109 \times 107$

(iii) $35 \times 37$

(iv) $53 \times 55$

(v) $103 \times 96$

(vi) $34 \times 36$

(vii) $994 \times 1006$

**Answer**

(i) $102 \times 106$

(100 + 2) (100 + 6)

= 100 (100 + 6) + 2 (100 + 6)

= 10000 + 600 + 200 + 12

= 10812

(ii) $109 \times 107$

This can be written as:

(100 + 9) (100 + 7)

= 100 (100 + 7) + 9 (100 + 7)

= 10000 + 700 + 900 + 63

= 11663

(iii) $35 \times 37$

This can be written as:

(30 + 5) (30 + 7)

= 30 (30 + 7) + 5 (30 + 7)

= 900 + 210 + 150 + 35

= 1295

(iv) $53 \times 55$

This can be written as:

(50 + 3) (50 + 5)

= 50 (50 + 5) + 3 (50 + 5)

= 2500 + 250 + 150 + 15

= 2915

(v) $103 \times 96$

This can be written as:

(100 + 3) (100 - 4)

= 100 (100 - 4) + 3 (100 - 4)

= 10000 - 400 + 300 - 12

= 10000 – 112

= 9888

(vi) $34 \times 36$

This can be written as:

(30 + 4) (30 + 6)

= 30 (30 + 6) + 4 (30 + 6)

= 900 + 180 + 120 + 24

= 1224

(vii) $994 \times 1006$

This can be written as:

(1000 - 6) (1000 + 6)

= 1000 (1000 + 6) - 6 (1000 + 6)

= 1000000 + 6000 - 6000 - 36

= 999964